HP Performance-Optimized Datacenter, 12 m (40 ft)
Site Requirements Information

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Intended audience

This document is for the person who installs, administers, and troubleshoots servers and storage systems. HP assumes you are qualified in the servicing of computer equipment and trained in recognizing hazards in products with hazardous energy levels.

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Site requirements

About this document

This document outlines the installation requirements for a 12 m (40 ft) HP POD. These guidelines are for a qualified architectural or consulting engineering team to generate site-specific documents for each HP POD installation. The site-specific installation documentation must comply with local building code jurisdictions.

Site preparation

The HP POD must be installed on a surface capable of supporting approximately 50,456 kg (111,000 lb). The site location for the HP POD must be level +/- 0.5 degrees tolerance. Appropriate clearance for installation, service, and system utilities (power and water) must also be considered.

IMPORTANT: Before installing the HP POD, consult your local AHJ for applicable codes and to review site-specific location guidelines.

IMPORTANT: The HP POD is designed for ground level installation. If you install the HP POD on an elevated surface, make sure the minimum height requirements for circuit breaker actuators are considered per local and national electric code requirements.

The area in front of the outside panels must include a work platform. The distance from the work platform surface to the center of any circuit breaker actuator handle must not exceed 183 cm (72 inches). The platform must be a minimum of 91 cm (36 inches) wide for free air, and if the platform construction is grounded metal, must be a minimum of 107 cm (42 inches) wide.

Safety information

The HP POD is certified to UL 69050/IEC 60950 as an Information Technology Product and Classified according to the National Electric Code NFPA-70, 2008

The HP POD is not suitable for long term human occupancy. The HP POD has service access areas for periodic maintenance and service. These areas must be used only by owner-authorized personnel who are trained in the maintenance and service of the HP POD IT components.

IMPORTANT: Before installing the HP POD, consult your local AHJ for applicable codes and to review site-specific location guidelines. If needed, obtain any necessary permits.

Before installing your HP POD, verify that the following prerequisites have been met:

- All components have been delivered to your facility.
- The HP POD, power distribution components, and water distribution components are in their final location.
- You have facility power at your final location.

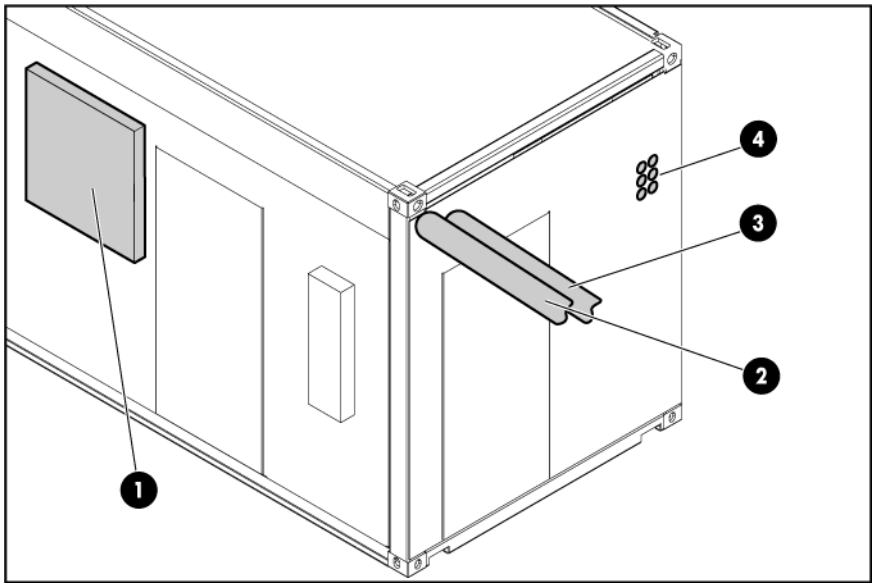
- You have chilled water at your final location.
- You have made provisions for properly grounding the HP POD.

System utilities

Your site location must accommodate the following utilities:

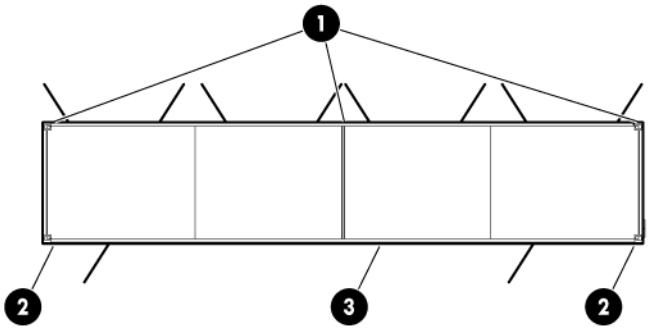
- Cooling water
- Electrical power ("Power" on page 5)
- Drainage (on page 6)

Power



Item	Description
1	Main input power junction box
2	Chilled water return connection
3	Chilled water supply connection
4	IT cable portals

Drainage



Item	Component
1	Heat exchanger condensate drains
2	Water main supply/return drain
3	Humidifier drain

Optional connections to central facility infrastructure

- HP POD ECS
- Life safety systems
- Convenience outlet power
- Site networking connection
- Domestic water for optional humidifier
- Security system (optional)

Environmental considerations

- (Optional) Install a properly engineered awning.
- Install lightning protection for the HP POD.
- Make sure that the HP POD is installed in a well lit area that complies with local workplace lighting regulations.
- Make sure that the HP POD is properly grounded.
- Avoid placing the HP POD directly along a drainage path or in an area prone to flooding.

Environmental specifications

Features	Specifications
Operating temperature	-18°C to 54°C (-0°F to 130°F). Supports to -29°C (-20°F) with optional cold weather protection installation.
Non-operating	-29°C to 54°C (-20°F to 130°F)

Features	Specifications
temperature*	
Operating humidity	• 0% to 100% relative noncondensing
Non-operating humidity*	• 5 to 95% relative noncondensing • 39°C (102°F) maximum wet bulb temperature
Operating altitude	-76.2 to 3,048 m (-250 to 10,000 ft)
Non-operating altitude	-76.2 to 9,144 m (-250 to 30,000 ft)

*For nonoperating specifications, consider the temperature of computer and IT equipment inside the HP POD. The HP POD must be drained before it is moved to a new location.
For areas prone to freezing, take the appropriate water freeze protection precautions.

Lightning protection

If the HP POD is installed in an outdoor environment, HP recommends hiring a lightning protection consultant to evaluate potential lightning risks and assess possible HP POD lightning protection schemes.

HP POD specifications

Dimensions

The HP POD is approximately 12.2 m (40 ft) long, 2.4 m (8 ft) wide, and 2.9 m (9.5 ft) tall.

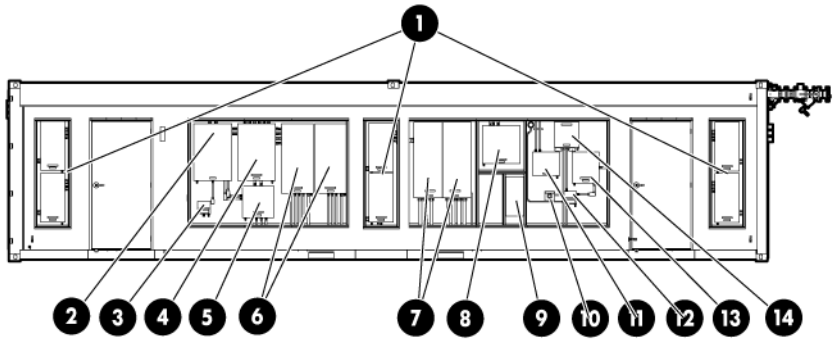
Weight

HP POD weight varies, depending on whether the HP POD is empty or configured with IT equipment. Computer racks and IT equipment add incremental weight to an empty HP POD and vary, depending on customization.

Specification	Approximate weight
Empty HP POD	15,454 kg (34,000 lb)
Maximum weight of IT equipment for each rack	1,364 kg (3,000 lb)
Maximum weight of IT equipment per HP POD	30,000 kg (66,000 lb)
Fully outfitted HP POD	47,854 kg (105,500 lb)

IMPORTANT: Before moving the HP POD to a new location, HP recommends contacting the local Department of Transportation for permit loads and other transportation requirements.

External cold aisle view



Item	Component
1*	Electrical busway 225A enclosed circuit breaker
2	ECS panel
3	Auxiliary single phase branch circuit power

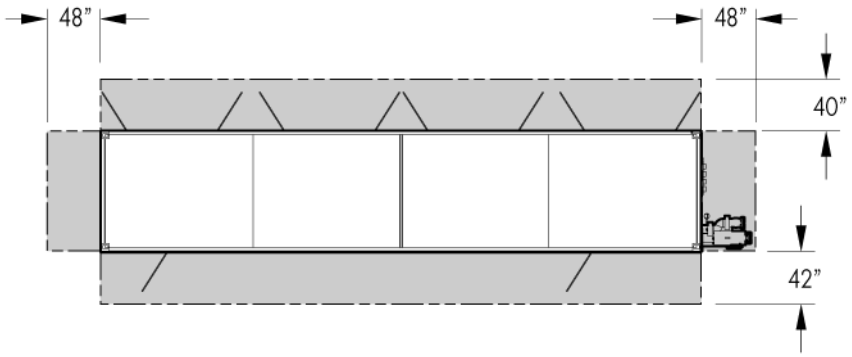
Item	Component
4	Fan control panel
5	Redundant relay panel
6	House panels
7	Main input power junction boxes
8	Security panel
9	Humidifier (optional)
10	EPO button
11	ASSD panel
12	Fire alarm XFMR
13	Fire alarm control panel
14	EPO panel

The middle 225A busway circuit breakers are present in the high density HP POD only.

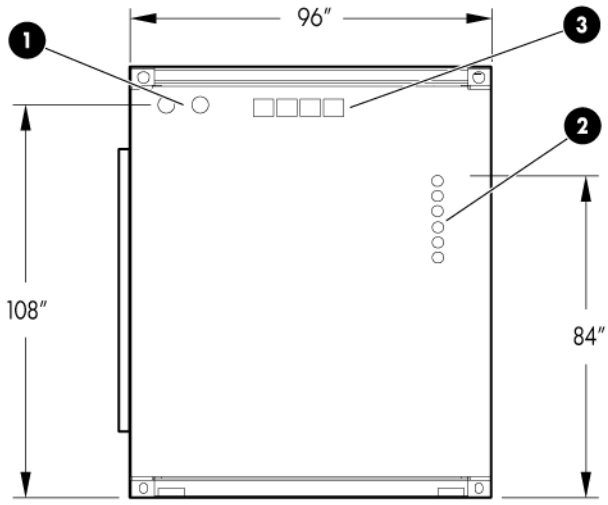
Required clearances

NOTE: Shaded areas indicate required clearances.

Top view

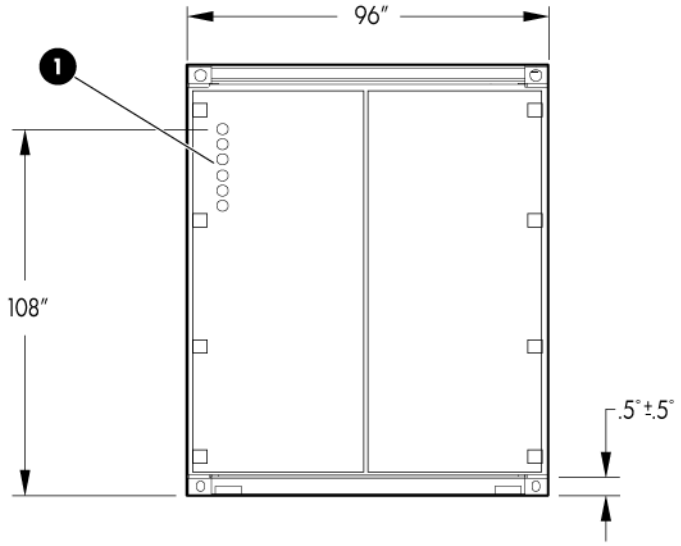


Water input side view



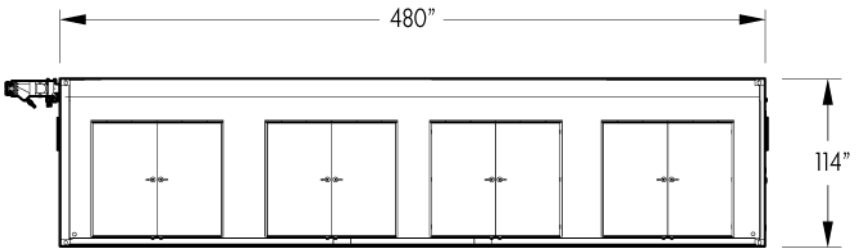
Callout	Feature
1	CWR/CWS portal 2.7 m (9 ft)
2	IT cable portals 2 m (7 ft)
3	Central facility infrastructure connection: • Fire • Security • Phone • Convenience power outlet

Double door end view



Callout	Feature
1	IT cable portals

External hot aisle view



Water supply specifications

Feature	Specification
Facility input temperature to HP POD	12° to 24°C (55° to 75°F)
Working pressure	1034 kPa (150 psi)
HP POD pressure drop	1732 kPa (25 psi)
HP POD water flow rate	908.5 l/min (240 gal/min)
Cooling water supply and return connections	Two 10.16 cm (4 in) ANSI/ASME 150# flanges
Humidifier	See the humidifier manual for exact humidifier requirements

Water quality requirements

Water quality requirements and specifications

- Closed-loop water must not contain any lime scale deposits or loose debris.
- The chilled water temperature to be supplied to the HP POD must be 12° to 24°C (55° to 75°F).

NOTE: Freezing water might cause a blockage and damage to the unit. In outside locations subject to freezing temperatures, an additive such as glycol might be necessary to lower the freezing point. However, since the heat transfer potential of water with glycol is lower, the HP POD must be derated accordingly.

NOTE: The water cycle must be drained completely, and then purged using compressed air when storing or transporting at or below freezing temperatures.

Acceptable water quality specifications

Water must be maintained per the following acceptable water quality standards.

Parameter	Range
pH	8.0–10
Specific conductance at 25°C (77°F)	0–2500 µmhos/cm
Alkalinity ("M" as $CaCO_3$)	150–1000 ppm
Sulfur (SO_4)	0–150 ppm
Chloride (Cl)	0–100 ppm
Hardness ($CaCO_3$)	0–350 ppm
Calcium hardness ($CaCO_3$)	0–200 ppm
Magnesium hardness ($CaCO_3$)	0–150 ppm
Copper (Cu)	< 0.20 ppm
Iron (Fe)	< 3.0 ppm
Aluminum (Al)	< 0.50 ppm
Sodium (Na)	0–1000 ppm
Silica (SiO_2)	0–150 ppm
Zinc (Zn)	< 1.0 ppm
Manganese (Mn)	< 0.1 ppm
Phosphate Ortho- (PO_4)	< 3 ppm
Bacteria	< 1000 CFU/ml
Suspended solids	< 10 ppm

If your water is out of range, consult a water quality expert.

Piping materials

Do not use the following interconnecting piping materials in a closed water system:

- Oxidizing biocides
- Aluminum components
- Brass components with high levels of zinc
- Non-stainless steel iron components

Water precautions

Take the following precautions before installation of the HP POD:

- Verify that all foreign matter and particulates are flushed from the system. Water might be discolored during the initial flushing of the system. Clear running water is the sign that all foreign matter and particulates have been flushed from the system.
- Evaluate the short-term and long-term system requirements against the available water capacity.
- Ensure that the chilled water loop is properly designed for liquid cooling systems and is separate from the sanitary water systems in your building (bathroom, sink, drinking water).
- Ensure facility managers are aware of the additional load being added to the chilled water supply of the building. Be aware that the added heat load might affect other components being cooled by the chilled water plant.

Condensation management

△ **CAUTION:** During operation, avoid leaving the HP POD doors open, to maintain accurate environmental conditions inside the HP POD.

Supply cooling water that is above the dew point inside the HP POD to prevent condensation forming on the heat exchangers.

The heat exchanger drip tray collects any condensation that forms on the heat exchangers. This collected condensate drains out of the HP POD through the heat exchanger condensate drains. HP recommends connecting condensate drains on the HP POD to a facility drain to prevent collection of water near the HP POD.

There are three 1.91 cm (¾ inch) condensate drain outlets are across the rear of the HP POD directly connected to the heat exchanger drip trays. There are two drains for the water main supply and return lines located on the front of the HP POD.

To avoid excessive buildup of condensate and to conserve energy, raise the cooling water temperature to above the dewpoint to manage condensation while maintaining the necessary cooling capacity.

Power management

Connection requirements

When determining the final location of your power and water connections, consider the distance between the facility utilities and the HP POD.

The facility power connection must be installed in compliance with local electrical codes and regulations. HP reference electrical installation design is based on a maximum distance of 15.2 m (50 ft) or line of sight between the switchboard and the HP POD.

HP can provide engineering services to develop the site installation plan and drawings as a supplemental service.

All 3-phase HP POD feeders require that the neutrals and the equipment grounding conductors remain isolated. Bonding of the two conductors is allowed at the power source only.

Power requirements

The HP POD is available in both standard and high density models.

North America

- The standard density HP POD can be configured for 291 kW redundant power paths for maximum reliability or 380 kW power paths for maximum capacity.
- The high density HP POD can be configured for 380 kW redundant power paths for maximum reliability or 600 kW power paths for maximum capacity.

International

- The standard density HP POD can be configured for 291 kW redundant power paths for maximum reliability or 450 kW power paths for maximum capacity.
- The high density HP POD can be configured for 436 kW redundant power paths for maximum reliability or 600 kW power paths for maximum capacity.

Standard density HP POD

The standard density HP POD must be supplied with four feeders.

- 3-phase
- 380 to 415V wye connected
- 225A
- 50 to 60 Hz

Each feeder must contain three phase conductors, one neutral conductor, and one equipment ground conductor.

Standard density HP POD with redundant power

Component	Quantity	Phases	Amps	Volts	Description
Primary feeders	2	3	225	415/240	Supply primary power path to IT equipment.
House power feeders	2	3	100	415/240	• One 100A feed to house panel A to power HP POD ECS, convenience outlet, lighting, and auxiliary equipment provided with the HP POD. • The second 100A feed supplies an alternate source of power to house panel B if power path A fails. All house panel loads are supplied from either house power panel A or B through high speed contactors.
Redundant feeders	2	3	225	415/240	Supply secondary power path to IT equipment.

Either the customer or HP (optional) supplies transformers to convert 3-phase, 480V delta power to 3-phase, 415V wye power, and switchboards to distribute branch circuit inputs to the HP POD.

NOTE: For locations outside North America, consult with HP regarding the requirements and specifications of transformers.

The customer must supply two 480V, 450A feeders to the transformers that will supply 415V 3-phase power to the HP POD. Each power source is capable of supporting the HP POD in the event of a power failure or planned maintenance.

Final connections to the HP POD can be supplied by the customer or by HP at additional cost.

Standard density HP POD without redundancy

Component	Quantity	Phases	Amps	Volts	Description
Primary feeders	2	3	225	415/240	Supply primary power path to IT equipment
House power feeders	1	3	100	415/240	House panel A supplies power to HP POD ECS, convenience outlet, lighting, and auxiliary equipment provided with the HP POD.
Primary feeders	2	3	225	415/240	Supply power path to IT equipment

Either the customer or HP (optional) supplies transformers to convert 3-phase, 480V delta power to 3-phase, 415V wye power, and switchboards to distribute branch circuit inputs to the HP POD.

NOTE: For locations outside North America, consult with HP regarding the requirements and specifications of transformers.

The customer must supply one 480V, 3-phase, 800A feeder to the transformer that will supply 415V 3 phase power to the HP POD.

Final connections to the HP POD can be supplied by the customer or by HP at additional costs.

High density HP POD

The high density HP POD must be supplied with six feeders.

- 3-phase
- 380 to 415V wye connected
- 50 to 60 Hz
- 225A

Each feeder must contain three phase conductors, one neutral conductor and one equipment ground conductor.

High density HP POD with redundant power

Component	Quantity	Phases	Amps	Volts	Description
Primary feeders	3	3	225	415/240	Supply primary power path to IT equipment.
House power feeders	2	3	100	415/240	• One 100A feed to house panel A to power convenience outlet, lighting, and auxiliary equipment provided with the HP POD. • The second 100A feed supplies an alternate source of power to house panel B if power path A fails. All house panel loads are supplied from either house power panel A or B through high speed contactors.
Redundant feeders	3	3	225	415/240	Supply secondary power path to IT equipment.

Either the customer or HP (optional) supplies transformers to convert 3-phase, 480V delta power to 3-phase, 415V wye power, and switchboards to distribute branch circuit inputs to the HP POD.

NOTE: For locations outside North America, consult with HP regarding the requirements and specifications of transformers.

The customer must supply two 800A, 480V delta, 3-phase feeders to the transformers that will supply 415V 3 phase power to the HP POD. Each power source is capable of supporting the HP POD in the event of a power failure or planned maintenance.

Final connections to the HP POD can be supplied by the customer or by HP at additional cost.

High density HP POD without redundancy

Component	Quantity	Phases	Amps	Volts	Description
Primary feeders	3	3	225	415/240	Supply primary power path to IT equipment.
House power feeders	1	3	100	415/240	House panel A supplies power to HP POD ECS, convenience outlet, lighting, and auxiliary equipment provided with

Component	Quantity	Phases	Amps	Volts	Description
					the HP POD.
Primary feeders	3	3	225	415/240	Supply power path to IT equipment.

Either the customer or HP (optional) supplies transformers to convert 3-phase, 480V delta power to 3-phase, 415V wye power, and switchboards to distribute feeder inputs to the HP POD.

NOTE: For locations outside North America, consult with HP regarding the requirements and specifications of transformers.

The customer must supply one 1200A, 480V delta, 3-phase feeder to the transformer that will supply 415V 3 phase power to the HP POD.

Final connections to the HP POD can be supplied by the customer or by HP at additional costs.

HP POD control power

HP POD control power is supplied by two redundant power house panels that are supplied with:

- 3-phase
- 380 to 415V wye connected
- 50 to 60 Hertz
- 100A

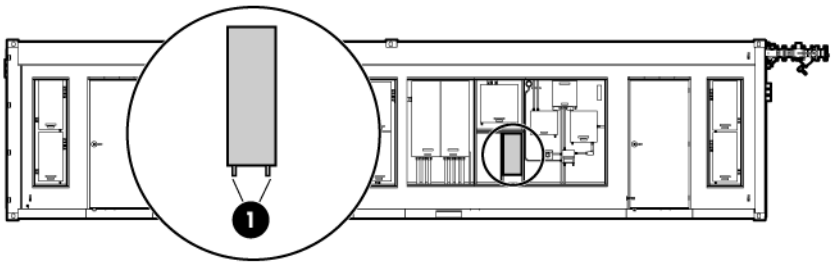
NOTE: Only one control power panel is required in the non-redundant power path configuration.

All 3-phase HP POD feeders require that the neutrals and the equipment grounding conductors remain isolated. Bonding of the two conductors is allowed at the power source only.

Supported facility connections

Humidifier specifications

A dedicated supply of domestic water is required if the optional humidifier is installed. For specifications, see the humidifier manual supplied with the HP POD.



Item	Component
1	Humidifier drain and water supply

For more information about the humidifier, see the documentation developed by the humidifier manufacturer.

Convenience outlets

The HP POD is prewired for a convenience outlet on the inside of the unit. This circuit is not part of the power provided by the main switchboard feeding the 3 phase power to the HP POD. To energize this circuit, you must supply a dedicated single phase, 16-or 20-amp branch circuit from your facility at the appropriate voltage. Make sure that the branch circuit is connected to the prewired exterior mounted junction box and that it is wired in accordance with local regulations and codes.

Grounding requirements

The neutrals and equipment grounding conductors for all 3-phase HP POD feeders must remain isolated. The two conductors can be bonded at the power source only.

Functional and supplementary grounding straps are provided between each rack and HP POD.

IMPORTANT: Before installing the HP POD, consult your local AHJ for applicable codes and to review site-specific location guidelines. If needed, obtain any necessary permits.

IMPORTANT: For full protection, you must ground the HP POD, power distribution components and the water distribution kit to your ground grid system.

IT cable portals

Six 6.35 cm (2 ½-inch) IT cable portals on each side of the HP POD are available for optional Ethernet, fiber optic, and IT cable configuration. These components are also used for ECS connections and can support dedicated lines, a customer network, and various other communications service options. You can install a weatherproof box for termination points over the cable portals on the outside of the HP POD.

Examples of cables that can run into the 6.35 cm (2 ½ inch) portals are as follows:

- 48 Cat-6 cables
- 39 12 strand multi-mode or single-mode fiber optic cables

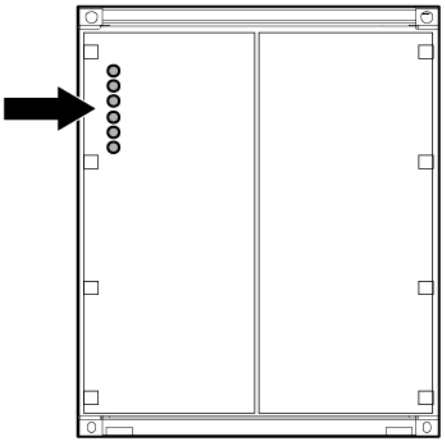
HP POD security

The HP POD is equipped with standard key lock hardware at each entry door and external panel. Conduit and junction boxes are provided for customer installed controlled access systems.

Optional controlled access security includes a 12-digit security code keypad and magnetic locks on each entry door.

HP POD Environmental Control System

The HP POD ECS is a stand-alone system that does not require any connections to existing facility management infrastructure. You can choose to connect to the facility BMS at an additional cost. BMS configuration communicates through an Ethernet cable connected to the internal HP POD ECS panel jack located underneath the IT cable portals. HP POD ECS data can be sent and viewed using a set IP address.



The HP POD ECS communicates through the standard BMS protocol, which is a data communication protocol for building automation and control networks.

The HP POD ECS offers:

- The ability to monitor the status of water and air temperatures, water pressures, and water flow rates
- Immediate notification of supported alarm messages

For additional points that can be monitored, see the I/O (Input/Output) Controls Points List.

Fire, safety, and security notifications

Dry contacts are provided to enable the connection between the fire alarm system and the central facility fire detection system, relay alarm, and trouble conditions at each HP POD.

Your building fire, safety, and security system relays the following HP POD-initiated alarms, which operate independently of each other.

Alarm	Meaning	Solution
Smoke alarm	Smoke has been detected in the HP POD.	Activate the EPO. Follow standard emergency procedures for your facility.
Security	A security breach has occurred.	Follow standard emergency procedures for your facility.
EPO	Someone has activated the EPO system and shut down the HP POD.	Follow standard emergency procedures for your facility.

The electrical layout of the fire alarm system is as described in the schematic drawing that is supplied with the HP POD.

Acronyms and abbreviations

ASSD

air sampling smoke detector

BMS

building management system

ECS

environmental control system

EPO

emergency power off

POD

Performance-Optimized Datacenter

TVSS

Transient Voltage Surge Suppression